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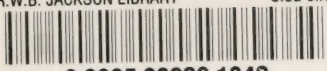
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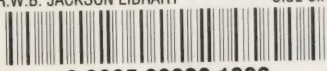
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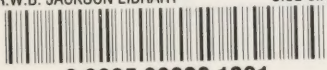
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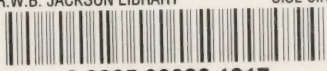
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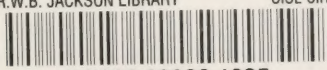
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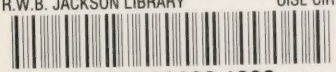
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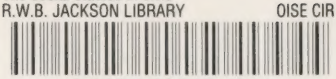
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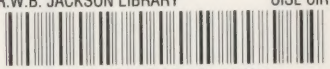
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MEDICAL EDUCATION
1920-1922

By

N. P. COLWELL, M. D.

SECRETARY OF THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS
OF THE AMERICAN MEDICAL ASSOCIATION

[Advance sheets from the Biennial Survey of Education in the United States, 1920–1922]

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MEDICAL EDUCATION, 1920–1922.

By N. P. Colwell, M. D.,

Secretary of the Council on Medical Education and Hospitals of the American Medical Association, Chicago.

Contents.—I. Progress in 20 years—More qualified students and graduates. II. Developments in medical schools—(1) Limitation of enrollments in medical schools—Do we need more medical schools?—(2) Increased cost of medical education—(3) Demand for teachers in the fundamental sciences—(4) Specialization in medical practice—(5) Revision of the medical curriculum—(6) Migration of physicians from rural communities to cities. III. Essential education for all who are to treat the sick—Confusion in medical licensure—A few victories of scientific medicine—Outlook for an improved medical education.

I. PROGRESS IN TWENTY YEARS.

As shown in previous reports, following the close of the Civil War the number of medical schools in the United States rapidly increased until in 1906 there were 162—more than in all the rest of the world. The educational standards, however, were considerably lower than those in other leading countries; so that the evident need was for "fewer but better medical schools." Two of the important objects to work for in the campaign for improvement, therefore, were (*a*) the general adoption of higher standards for admission, and (*b*) the merging of medical schools in cities where two or more existed. During the past 18 years the number of medical schools has been reduced by just one-half—from 162 to 81—about two-thirds of the reduction being due to mergers. The medical schools which became extinct, with a few exceptions, were low-grade institutions.

The number of colleges enforcing higher entrance requirements during the 18 years increased from 2 to 74; and the entrance requirements of medical schools of the United States are now equal to those in medical schools abroad. These changes are graphically shown in Chart 1.

The heavy line in the upper part of the chart shows the total number of medical colleges existing in each year.

The shaded portion of the chart shows the number of medical schools in each year which required for admission one year of college work (light shading) and two or more years of college work (heavy shading).

From the best available information, it appears that, prior to 1900, less than one-fourth of the medical schools required even a high-school education for admission. In 1907, about 80, or approximately one-half, and in 1910 about 100, or three-fourths of the medical schools, announced an entrance requirement of at least a high-school education. In the other colleges a common-school education was all that was necessary to secure admission.

Six epochs in the development of medical schools are shown in the above chart, as follows:

A. During the decade from 1870 to 1880, through the work of Pasteur and other medical research workers, the germ origin of the common diseases was definitely

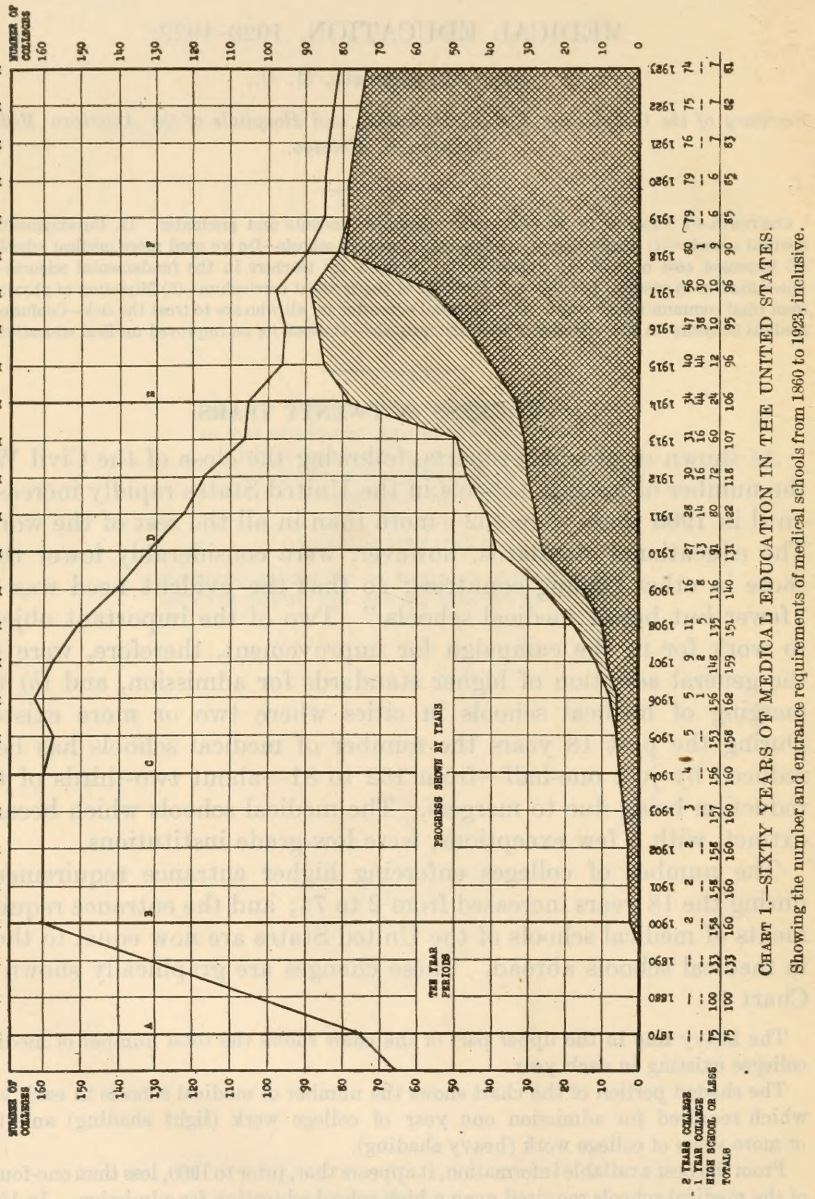

CHART 1.—SIXTY YEARS OF MEDICAL EDUCATION IN THE UNITED STATES.

Showing the number and entrance requirements of medical schools from 1860 to 1923, inclusive.

established. During the 30 years ending in 1900, the number of medical schools in the United States was rapidly multiplied, increasing from 75 to 160;

B. In 1900 the Journal of the American Medical Association began collecting and publishing statistics in regard to medical schools and medical education;

C. In 1904 a permanent committee, the Council on Medical Education, was created by the American Medical Association to work for the improvement of medical education in the United States;

D. In 1909–10 the Carnegie Foundation for the Advancement of Teaching, in conjunction with the Council on Medical Education, made an investigation of medical schools, and in the latter year published its report;

E. In 1914 the requirement of at least one year of college work; and—

F. In 1918 of two years of college work was made an essential for the Class A rating by the Council on Medical Education.

TABLE 1.—*Enrollments of medical students for nine years, showing variation in numbers by classes.*

College session.	Freshmen.	Sophomores.	Juniors.	Seniors.	Intern year.	Total.
1914–15	3,373	3,919	3,675	3,864	.....	14,891
1915–16	3,582	3,094	3,559	3,727	.....	14,022
1916–17	4,107	3,117	2,866	3,674	.....	13,764
1917–18	4,283	3,521	2,893	2,933	.....	13,630
1918–19	3,104	3,587	3,272	2,967	122	13,052
1919–20	4,234	2,837	3,464	3,263	290	14,088
1920–21	4,825	3,588	2,637	3,416	406	14,872
1921–22	5,412	4,219	3,355	2,649	505	16,140
1922–23[1]	5,224	4,626	3,972	3,278	600	17,700

[1] Estimate.

The constant line drawn through the table underscores the figures which show the lowest ebb in the enrollment in the respective classes following the adoption of higher entrance requirements. A temporary diminution in the numbers—figures underscored by the dotted lines—began with the freshmen in 1918–19, which was due to the enlistments in the World War. While the figures for 1922–23 are estimated, they are fairly accurate, since reports from all but a few colleges were obtained.

MORE WELL-QUALIFIED STUDENTS AND GRADUATES.

The merging of medical schools resulted also in a decrease in the number of medical students. The oversupply of medical schools in 1904 meant also an oversupply of medical students. The total number was reduced from 28,142 in 1904 to 13,052—the lowest number—in 1919, but since that year the number increased to 14,088 in 1920, to 14,872 in 1921, and to 16,140 in 1922. The reduction in the number of students was of those having lower educational qualifications, while the number of those in the higher-standard medical schools increased from 1,761 in 1904 to 15,477 in 1921.

Although the total number of graduates decreased from 5,742 in 1904 to 3,192 in 1921, the number of those graduating from the higher-grade medical schools increased from 369 in 1904 to 3,112 in 1921. There were only 2,529 students graduated in 1922, this being the small class which entered the medical schools in 1918, the war year. The numbers who will graduate in 1923, in 1924, and in 1925 are estimated at 3,200, 4,100, and 5,200.

The enrollment of students by classes during nine years is shown in Table 1. The lowest enrollment resulting from higher entrance standards began with the freshman class entering in 1914, culmi-

nating in the lowest number of students in all classes in 1918–19. A secondary wave of low enrollment began with the freshman class entering in the fall of 1918—the World War year—which culminated in the smallest number of graduates in 1922.

II. DEVELOPMENTS IN MEDICAL SCHOOLS.

The developments in medical schools during the past 20 years have been so extensive as to be almost sensational. The improvements in admission requirements, as shown in Chart 1, have been paralleled by similarly rapid improvements in other respects: Endowments of medical schools have been increased; new and larger buildings have been erected; more and better equipped laboratories have been added; well selected libraries have been installed; more all-time and better trained professors have been secured; new and larger teaching hospitals have been built, or a larger control of other hospitals has been secured; and greatly improved methods of instruction have been adopted.

Indeed, these developments were absolutely essential to enable the medical schools to provide instruction in accordance with the present-day knowledge of medicine. Besides the changes in the character of the medical school and of medical education, the great expansion of medical knowledge is also making necessary improved methods in other directions. Several problems have arisen directly or indirectly from the more complex medical training which is now furnished to medical graduates. Some of these are as follows:

(1) Medical schools have found it necessary to limit the enrollment of students.

(2) The cost of furnishing a medical education has been tremendously increased.

(3) There is a larger demand for skilled teachers, especially in the fundamental medical sciences or preclinical subjects.

(4) There is an increasing trend toward specialization and group practice of medicine.

(5) There is a growing demand for a revision of the medical curriculum by which the laboratory and clinical subjects will be better correlated.

(6) There has developed a complaint regarding the lack of general practitioners, especially in the thinly settled or rural districts.

1. LIMITATION OF ENROLLMENTS IN MEDICAL SCHOOLS.

A few decades ago the medical course consisted mainly of didactic lectures, and no limitation of enrollments was necessary. As classes grew larger, the size of lecture amphitheaters was increased, in some instances providing seats for classes of 500 or more students. Even after laboratory courses were added, these schools provided enor-

mous laboratories, particularly in anatomy and chemistry; and a few colleges had laboratories large enough in which to teach at one time several hundred medical, dental, and pharmacy students.

Of the modern medical school, however, the curriculum has become more complex, and the students are taught largely in small sections, especially in dispensaries and hospitals; so that a larger number of individual teachers is required, and administration is more difficult. To prevent confusion and to secure the maximum efficiency, therefore, it has become necessary for medical schools to admit no more students than their teachers, laboratory space, and available hospital and dispensary facilities will permit.

At present 47 medical schools are limiting their enrollments to 25 to 125 students in each class, and report a total capacity for 11,925 students. Nineteen others have an estimated capacity for 4,400 students, making a total capacity in the 66 Class A medical schools for 15,925 students. During the session of 1921–22 these colleges enrolled 14,625 students, while 1,515 were in Class B and Class C colleges.

TABLE 2.—*Capacity of medical schools under limited enrollments.*

Colleges.	Number of colleges.	Total enrollment—					Average per college.
		First year.	Second year.	Third year.	Fourth year.	Total for 4 years.	
Class A, medical colleges:							
4-year colleges	42	3,185	2,050	2,990	2,970	11,195	267
2-year colleges	5	165	165	.....	.....	330	66
Estimated highest capacity with efficiency:							
4-year colleges	14	1,145	1,005	930	900	3,980	274
2-year colleges	5	210	210	.....	.....	420	84
Total, class A colleges	66	4,705	3,430	3,920	3,870	15,925	691
Class B colleges:							
Capacity reported	3	120	120	125	125	490	163
Capacity estimated	3	100	100	100	100	400	133
Total, class B colleges	6	220	220	225	225	890	296
Total, A and B colleges	72	4,925	3,650	4,145	4,095	16,815	234

Sixteen class A medical schools report that, by adding additional teachers or by enlarging certain laboratories, or by other minor modifications, provision can be made for 1,500 more students, thereby increasing the capacity of the 66 class A schools to 17,425 students—about 1,200 more students than were enrolled in all medical schools in 1922.

Eleven medical schools teach only the subjects contained in the first two years of the medical course. Two of these—the Universities of Missouri and Wisconsin—are now preparing to give the complete four-year medical course.

DO WE NEED MORE MEDICAL SCHOOLS?

Well qualified students applying for admission to medical schools have rapidly increased in number in the past three years (1920–1922). This, coupled with the tendency of medical colleges to limit their enrollments, has caused some anxiety lest some well-qualified students will be unable to secure admission to acceptable medical colleges. To prevent such a condition, some medical schools which have placed their limits at extremely low numbers—25 or 30 in a class—should enlarge their facilities so as to admit larger numbers. A medical school with a complete corps of instructors should be able to handle from 50 to 75 students in a class. The enrollment of smaller numbers causes a serious disproportion between the fees paid by the student and the much larger sum expended for his instruction. Unfortunately, some medical schools are not sufficiently financed to care for even moderate-sized classes. In a recent report on medical education,[1] Dr. Henry S. Pritchett points out that to solve the problems of medical education, instead of building up a small number of richly endowed medical schools, the moderately endowed medical schools scattered throughout this country should be sufficiently financed to enable them to provide a modern training in medicine. Doctor Pritchett says that an important construction work is "to restore medical schools in some communities where they have been abandoned and in other communities to aid weak schools that sincerely seek their own improvements." It is very evident that a few hundred thousand dollars distributed among smaller but deserving medical schools at the present time would be of greater service to the public than additional millions given to one of the few institutions which are already so generously endowed.

2. THE INCREASED COST OF MEDICAL EDUCATION.

The cost of conducting medical schools has been tremendously increased during the past 25 years. Buildings have been enlarged and made more numerous, making necessary a greater cost for lighting, heating, and janitor service. A larger expenditure is necessary for administration, for records, and for clerical assistance. The greater number of laboratories has increased the cost for equipment and maintenance. A larger expenditure is required also for medical research, for the maintenance of library and museum, and for dispensaries and hospitals, unless satisfactory use can be made of city, State, or private institutions. The largest single item, however, is the expenditure for salaries paid to the essential expert teachers who devote their entire time to teaching and research in the laboratory departments. Salaries are now paid by several medical schools

[1] Carnegie Foundation for the Advancement of Teaching, Sixteenth An. Rept. (1921), p. 49.

also for full-time professors in the clinical departments, where heretofore these chairs were occupied by those engaged in practice, the prestige from teaching positions being frequently more valuable than the salaries. If clinical teachers are generally placed on a salary basis, the expense for instruction will be still further increased.

Where formerly medical schools could be maintained on students' fees alone, and frequently with a profit to the owners, now, with the extensive developments which were necessary to furnish a training in modern medicine, the cost is nearly three times greater than the sum obtained by students' fees.

Reports from 69 medical schools in regard to income and expenditures during 1920–21 show that the average income was $130,672, including $35,135 (26.9 per cent) obtained from students' fees, and $95,537 from other sources.

The average expenditure by each college was $123,947, including $46,162 (37 per cent) for all-time teachers, $21,131 (17 per cent) for part-time teachers, $19,068 for wages, and $36,974 for maintenance and supplies. The average yearly fee obtained from each student was $185, and the average amount expended for each student was $655. In 1916 the average fee paid by each student was $150, and the average expended for each student was $419. In the five years, therefore, the average expenditure per student increased 56 per cent, while the tuition fee increased 24 per cent.

3. DEMAND FOR TEACHERS IN THE FUNDAMENTAL SCIENCES.

In the campaign for the improvement of medical education, emphasis was laid on the need of expert teachers who would devote their entire time to teaching and research in the fundamental medical sciences. There were few graduates in medicine who had prepared themselves as specialists in teaching; so that many of these places were filled necessarily by graduates in arts and sciences who had no medical training. Others, however, had secured their doctorate in philosophy or other higher degrees and had majored in the medical sciences which they were teaching. Even with these nonmedical teachers, however, and as medical schools have continued to expand, the lack of those who are prepared to teach the preclinical branches has become more and more serious.

The shortage is due to several causes: (1) Few definite courses of instruction have been laid down whereby recent graduates in medicine or in arts can prepare themselves for teaching positions; (2) the present unsatisfactory arrangement of the medical curriculum does not give teachers of the medical science the recognition which they should have in the diagnosis and treatment of the sick; and (3) the

salaries are so small that recent graduates in medicine prefer to go into active practice.

The means of relief are now slowly being provided, as indicated by the following activities:

(*a*) A survey of graduate education both in the preclinical and clinical branches of medicine has just been completed, following which universities will be urged to establish courses of instruction for those who desire to take up teaching as a profession. When such courses have been established, students in medicine will soon know of them and can register for such courses immediately after graduation.

(*b*) A careful study of the medical curriculum is now being made looking to a reorganization whereby the teaching of the preclinical and the clinical branches may be brought in closer correlation.

(*c*) During the past few years particularly, salaries for teachers in the medical sciences have been considerably increased, and will doubtless continue to advance as professors in these sciences are given opportunity to demonstrate the value of their cooperation and advice in the actual treatment of patients. The salary problem has been aided indirectly in recent years by the tendency toward placing the chairs in the various clinical subjects, medicine, surgery, pediatrics, etc., on a full-time basis. To secure such teachers, it has been necessary to pay larger salaries than have heretofore been paid to teachers in the laboratory sciences—teachers who in many instances are doubtless as conscientious, faithful, and expert in their work as those occupying clinical chairs. This is helping toward a readjustment of the salaries of all teachers.

(*d*) To aid in relieving the shortage of laboratory teachers, the Rockefeller Foundation in June, 1922, gave $1,000,000 to the National Research Council to establish fellowships by which students desiring to enter the teaching profession might secure the essential work in any high-grade university of their choice. At the present time, there are 26 such students taking courses in the universities in the United States.

The shortage of teachers can be further relieved by the establishing of fellowships by the graduate schools of a large number of universities having medical departments, similar to what has been done by the University of Minnesota and the University of Pennsylvania. While preparing himself for his chosen specialty, the fellow is required to do a certain amount of teaching and research. Those who show special ability as teachers can be retained on the teaching staff of the university or be recommended to positions in other medical schools having need of them. On satisfactory completion of the course of instruction, the graduate student in the Universities of Minnesota and Pennsylvania is granted a higher degree, such as the

master of science or doctor of philosophy, modified by the name of the subject in which he has majored.

Most of our leading universities already have the facilities for establishing such fellowships. They have their graduate schools which should naturally supervise all such courses. They are continually employing minor assistants in the teaching of the various fundamental medical sciences, and these positions could readily be converted into teaching fellowships similar to those established at Minnesota. The salary paid at present to a minor teaching assistant would pay the stipend for one or possibly two fellowships. In the clinical branches, likewise, the professors are even now taking into their offices recent graduates to aid them as assistants or as residents in hospitals to aid them in the care of their patients. These assistants might easily be included in courses for "fellows" or "teaching assistants" who would prepare themselves in the specialties. Such an arrangement would be to the advantage of the professors as well as of the students. Each prominent physician would have a constant source of supply of young physicians who would act as expert clinical clerks, second assistants, and finally first assistants in connection with the care of his patients in the hospital and in his office. Many recent graduates are now taking such work, but not in properly organized courses, and even though the student does extremely satisfactory work he gets no recognition in the way of an advanced degree. Herein lies a field the development of which has great possibilities for good.

4. SPECIALIZATION IN MEDICAL PRACTICE.

During the past 40 years more progress has been made in the field of medicine than in all previous centuries. Aside from the field of anatomy, medical knowledge formerly consisted largely of theories and deductions based on observations and clinical experience in the care of the sick. With the work of Pasteur, however, an era of medical investigation began which, within the next several years, definitely established the germ origin of most of the common diseases. The definite knowledge of bacteria led in turn to methods of preventing infection, thereby making possible the marvelous developments in the field of surgery. Theory and guesswork gave way to demonstrable facts in the cause, cure, and prevention of disease; and the teaching and practice of medicine were revolutionized. Instead of a short two-year course of lectures, the medical school now gives instruction in eight or more laboratories, as well as in dispensaries and hospitals, covering four years of eight or nine months each. The curriculum has become more and more complex as the valuable methods of diagnosis, treatment, and prevention of diseases have been multiplied.

With this enlarged field of medical knowledge there has developed an increasing tendency for physicians to limit their practice to some one of the various specialities. This has been due, to a certain extent at least, to the evident overemphasis laid by the public in recent years on treatment by "specialists," whether or not they deserve that title. Whether, by so doing, the public obtains the best treatment may be questioned. Specialists, if properly trained, are of real service to the public, but unfortunately there are some who pose as specialists but who lack the basic training and skill which that title should indicate. In order to develop a high degree of knowledge and skill in one specialty the physician must necessarily neglect the other portions of the field of general medicine. Unless, therefore, he has developed a skill in recognizing all types of disease before he begins to specialize, he is not likely to obtain it at all. Preferably, the physician should select a specialty only after he has had the experience of several years as a general practitioner.

There is a legitimate field for specialists, but the need should not be exaggerated. Physicians of high reputation state that from 80 to 90 per cent of all cases of illness can be best cared for by well-trained general practitioners. The great majority of physicians can best serve the public by remaining in general practice. Those who have graduated during the last several years have secured a training in the latest and best methods of both diagnosis and treatment. Furthermore, the fact that they are seeing and studying all types of illness places them in position not only to care for the very large proportion of patients who come to them but also to recognize in the exceptional patient the need of treatment by a specialist.

5. REVISION OF THE MEDICAL CURRICULUM.

The medical curriculum has always been a subject for discussion at educational conferences, and changes of greater or less consequence are frequently made. With the rapid expansion of medical knowledge and the consequent enlargement of the curriculum, an unsatisfactory situation has developed whereby the laboratory subjects (anatomy, physiology, biochemistry, etc.) are taught in the first two years separately from the clinical subjects (medicine, surgery, ophthalmology, etc.), which are taught in the last two years of the medical course. As a consequence, the student on entering the third year considers that he has "finished" the work in the laboratory sciences and in many instances proceeds to forget, even if he has ever learned, the essential facts of those sciences and their relation to the clinical subjects. There is at present a general demand for a reorganization of the curriculum whereby the laboratory and clinical subjects will be taught more nearly parallel, in order

that a closer correlation of the two groups of subjects may be obtained.

Various steps have been taken to secure such correlation. An important example is the establishing of clinical-pathological conferences, through which the departments of internal medicine and pathology are cooperating to establish a better understanding of the pathological conditions which underlie the various symptoms in the living patients. Correlation between pathology and surgery has been provided in the course of surgical pathology, and cooperation between internal medicine and the departments of chemistry and physiology is provided in the study, respectively, of metabolism and in the use of the cardiograph. A close relationship exists in some medical schools, also, between the departments of internal medicine and of pharmacology and therapeutics. These measures, however, are only a beginning, but indicate the value of a more extensive cooperation between laboratories and clinical subjects.

One of the chief difficulties in securing this cooperation is that the laboratory departments are in a separate building from the clinical departments, and in some schools the laboratory and clinical departments are several miles apart or even in different cities. There are also some medical schools teaching only the laboratory subjects, no facilities being available for the teaching of the clinical subjects.

The needed revision in the medical curriculum, therefore, means, first of all, a complete plant which not only should include laboratory and clinical subjects but also should be on the university campus in close proximity to the premedical sciences, physics, chemistry, and biology. This will be important particularly in the needed development of graduate medical courses, which should be under the direct supervision of the graduate school of the university.

To establish a closer physical contact of the laboratory with the clinical departments, some medical schools are already erecting buildings for laboratory departments as wings or parts of their hospital buildings; and at the present time plans for several new hospitals, notably that of Vanderbilt University at Nashville, include in the same building wings for the laboratory departments connecting immediately with hospital wards. Such an arrangement will help to solve some of the most acute problems in medical education. Hereafter, instead of being isolated in their respective departments, the professors of the laboratory subjects should be in the hospital and will function as members of the hospital staff. Such an arrangement can not fail to secure for the clinician a better knowledge of the laboratory sciences, but also the professors of the laboratory branches will obtain a broader knowledge of conditions underlying diseases. Hereafter the medical student from the beginning will be in intimate

contact with the patients, where the knowledge he obtains of the laboratory subjects will be correlated with the instruction he is receiving in regard to the diagnosis, treatment, and prevention of disease. Both normal and abnormal conditions will be better understood because they are brought into direct contrast. This closer relationship in the teaching of laboratory and clinical subjects, therefore, can not help but provide in the future for a better and more intelligent care of the sick.

6. MIGRATION OF PHYSICIANS FROM RURAL COMMUNITIES TO CITIES.

Physicians are following the general trend of population toward the cities, but in a larger proportion. Statistics show that 47.1 per cent of the population of the United States is now contained in cities of 5,000 and over, while 63 per cent of all physicians are located in those cities.

TABLE 3.—*Urban or rural population and supply of physicians.*

Population of cities.[1]	Number of cities.	Total population.	Per cent population.	Number of physicians.[2]	Ratio of physicians to population.	Percentage all physicians.
500,000 and above	12	16,369,310	15.5	30,932	529	21.0
200,000 to 500,000	21	6,353,645	6.1	12,862	493	9.0
50,000 to 200,000	111	9,973,462	9.4	17,254	578	12.0
10,000 to 50,000	662	12,017,783	11.4	21,204	563	15.0
5,000 to 10,000	721	4,997,794	4.7	9,313	527	6.0
Below 5,000	.....	56,153,587	52.9	54,043	1,020	37.0
Total	.....	105,708,771	100.0	145,608	726	100.0
Total in cities of 5,000 and over	.....	.....	47.1	91,565	.....	.....

[1] Population figures based on report of the Census Bureau for 1920.
[2] Figures regarding the numbers of physicians are from the American Medical Directory for 1921.

The scarcity of doctors in rural communities is not due to an inadequate supply of physicians, since the shortage in rural communities is more than offset by the oversupply in the cities. There is no need, therefore, for special methods to swell the ranks of the medical profession. As already shown in this article, also, the numbers of medical students, even under the higher entrance requirements, are so large as to make it difficult for medical schools to provide for them.

The reasons for the shortage of physicians in rural communities are outlined as follows:

(*a*) Many doctors in rural communities graduated when standards of medical education were low, and before medical schools had undergone the tremendous developments which have taken place during the past 15 or 20 years. Although some of these have kept in touch with the progress in medical knowledge, there are many who for financial or other reasons could not get away to secure a postgraduate education.

(*b*) The recent graduate in medicine with his improved training naturally prefers to live in the city with its better social, educational, and living conditions, also—

(*c*) The trend in recent years for the treatment of patients in hospitals has been rapid, especially where surgical procedures are required, and—

(*d*) Hospitals are built only in cities, in centers where the population is sufficiently large to insure their support.

(*e*) For the reasons specified, people in rural districts who are able to pay fees go to the near-by cities to doctors who have established reputations and where they can secure hospital care.

(*f*) This leaves for the country doctor only emergency cases and patients who are unable to, or do not, pay reasonably high fees.

(*g*) This situation has become worse as the automobile, country roads, and other transportation facilities have been improved.

(*h*) While there always has been a scarcity of physicians in rural districts, the situation became more acute when the war furnished the opportunity for many physicians to get away from the country districts. Then, at the close of the war, they obtained postgraduate work and sought more favorable locations. Meanwhile, investigation of many rural districts from which requests for physicians have come shows that in most of them physicians could not make a livelihood without undue sacrifice and difficulty.

It is suggested that in any community needing a physician, a number of individuals pledge themselves to guarantee an income of from $2,500 to $3,000 a year, and to interest the community in a physician's support. This plan was tried in a community in the Middle West, where 25 citizens are said to have pledged $100 each—$2,500 per year—as a guaranty, the contract covering a period of five years. A report states that the physician selected has been obtaining an average of $300 per month, that his five-year period is nearly up, and that he already has enough signers to guarantee his stay for another five years.

Such a plan has two strong points in its favor: (*a*) The people of the community have a voice in the selection of their physician, and (*b*) the fact that they have pledged themselves to his support will induce them to patronize him so far as is possible, and not go to physicians in distant cities.

With the establishing of such guaranties, it is believed that a well-trained physician can be obtained by any community where there are enough people to support one. The majority of physicians are short of funds at the time they complete their medical training, and will be attracted to places where some income, however small, is guaranteed. Such opportunities are available mostly in cities.

Reasonable guaranties, therefore, from rural districts will be attractive to recent graduates and help to bring about a wider distribution of them.

III. ESSENTIAL EDUCATION FOR ALL WHO ARE TO TREAT THE SICK.

As already shown in this report, the field of medical knowledge has been greatly increased during the past 50 years, making necessary a more extended and complex medical curriculum, which, in turn, requires laboratories, library, museum, and other equipment such as is possessed by all our recognized colleges. Essential, also, are a large hospital and an out-patient department where the students are instructed at the bedside in the diagnosis and treatment of diseases.

Before he can independently assume the right to care for sick or injured people the physician at the present day, after graduation from the high school, must secure the following education:

(*a*) Two or more years' work in a recognized college or university.
(*b*) Four years of eight or nine months each in an acceptable medical school.
(*c*) One or more years spent as a resident physician or intern in an approved hospital.

If, instead of entering general practice, he wishes to specialize in some narrower line, such as surgery, children's diseases, eye, ear, nose, and throat, etc., he should also take—

(*d*) Two or three years of review courses and higher apprentice work with some physician who has already attained proficiency in the chosen specialty.

Reference has already been made to the expense of conducting a modern medical school, which amounts to about three times what the school obtains in fees from its students. As a consequence the modern medical school has to have an additional income, either from State appropriations or private endowment.

CONFUSION IN MEDICAL LICENSURE.

Along with the great improvements in medical schools and the increases in their entrance requirements there has been—and properly—a corresponding advance in the educational qualifications required of physicians by State medical licensing boards. While the medical practice laws have been established to safeguard the public against incompetent or untrained physicians, much confusion has been caused by the passing of laws which have the effect of nullifying the practice acts, in that others are enabled to secure licenses to treat the sick without having to possess the educational qualifications fixed by the medical practice act.

At the present time, instead of one law and one board in each State to enforce its provisions, there are, in the 48 States, 96 separate

and independent boards, some States having as many as five or six different boards, created by as many independent practice acts outlining as many differing standards of educational qualifications. One can readily believe that in such confusion the public interests have been largely disregarded.

This confusion is due to a lack of understanding on the part of the public and of State legislators as to what constitutes the practice of medicine, or possibly better termed, the practice of the healing art. The fixing of minimum essential educational qualifications for physicians can not serve as a protection of the public unless the standard fixed is applied equally to everyone else who is granted a license to care for sick people as a profession.

Besides the regular, or "orthodox," medical schools there have always been also the unorthodox or sectarian "schools" which later, as the scientific basis of medicine has been established, have become extinct or have dropped their sectarian character. Some of the "schools" referred to—such as homeopathy, eclecticism, and physiomedicalism—have had little or no serious consequences, since they made no claims of being other than "medical" schools; their teachers were physicians, their educational standards were the same as for "regular" medical schools, and they were subject to the same or similar medical practice laws. The chief differences were of opinion in regard to the action or character of certain drugs or remedies used. Heretofore, indeed, there has been ample room for such differences of opinion. Prior to the researches of Pasteur, medical knowledge consisted largely of a collection of treatises and theories based on clinical observations; and because of the lack of scientific procedures, one physician's theory was believed to be as worthy of consideration as another's.

But there are other sectarian "schools" besides those already alluded to whose teachers, as a rule, are not physicians, nor have they obtained a medical training; their educational standards are decidedly inferior to those of medical schools, and they have not been made subject to medical practice laws.

The experimental research work carried on since 1870 by Pasteur, Koch, Klebs, Neisser, Kitasato, Flexner, and others has resulted in indisputable proof that most of the common diseases afflicting mankind are due to specific bacteria or germs. Theories and guesswork in the field of medicine, therefore, have been replaced by scientific facts and procedures—facts which are the basis of the medical teaching in all our university medical schools. It is entirely reasonable at the present time, therefore, that, in the interest of the public, a minimum standard of educational qualifications, recognizing these advances in medical knowledge, should be established for everyone who

is to be authorized to treat the sick. If laws regulating the practice of the healing art are at all necessary, then they should (*a*) insist on the minimum educational qualifications which are essential properly to train one in the art of healing and (*b*) provide for one board of well-qualified members to enforce the law in each State. The license issued in any State should be a guaranty to the public that its holder is qualified to assume the responsibility for the care of sick human beings.

This is an educational problem and can be solved only as approached from that point of view. The danger from these groups of practitioners is to the public, through the confusion they are causing—at least temporarily—in educational and public health laws. Should not the standards of professional training in our State universities apply to all who practice any particular profession? Granting that there is good in some cases in the methods of treatment advocated by these "schools," that good would in no way be diminished if those who practice them were required to have a reasonable preliminary education and some knowledge, at least, of the fundamental medical sciences. It might not be amiss also, if he should learn of some of the great victories of modern medicine in ridding the world of most of its epidemic diseases.

A FEW VICTORIES OF SCIENTIFIC MEDICINE.

(*a*) The discovery of the germ origin of disease has led to the practical extinction of many diseases, including such death-dealing epidemics as Asiatic cholera, bubonic plague, and diphtheria.

(*b*) The discovery of the diphtheria bacillus led to the knowledge of how to assist nature in curing the disease through the use of diphtheria antitoxin artificially manufactured. This has greatly reduced the mortality of the occasional cases of this disease.

(*c*) Typhoid fever has been conquered by the discovery of the typhoid vaccine. This disease, which raised such havoc among the armies in preceding wars, was so scarce during the World War as to make it an almost negligible factor among the causes of death.

(*d*) The discovery that the germ of yellow fever was transmitted through the bite of a mosquito has led almost to the extermination of that disease; has changed localities in the South and in Central America from pestholes of diseases to places of safe human habitation and, incidentally, permitted the completion of the Panama Canal.

These are but a few of the many victories which could be described. And the scientific basis of medicine is still being gradually enlarged. Recently there have been two other noteworthy achievements. One is the discovery of insulin, and the method by which it can be extracted from the pancreas. Careful tests have shown it to be of

special value in the treatment of diabetes. The other is the method of isolating the germ of influenza, which, it is hoped, may lead to a more serviceable knowledge of that disease.

OUTLOOK FOR AN IMPROVED MEDICAL EDUCATION.

That our universities still have faith in the science of medicine is evidenced by the great wave of reconstruction of medical college plants. Many improvements have already been made in this respect in the past 15 years. Great constructive programs are now being carried out, or have been quite definitely planned, for the medical schools of the following universities:

Colorado.	Indiana.	Rochester.
Yale.	Iowa.	Cincinnati.
Emory.	Johns Hopkins.	Western Reserve.
Chicago.	Minnesota.	Oregon.
Harvard.	St. Louis.	Vanderbilt.
Illinois.	Washington.	Wisconsin.
Northwestern.	Nebraska.	

When the whole picture is viewed, the developments in the knowledge of medicine and the methods and facilities for medical teaching and practice have been no less remarkable—although perhaps less sensational or spectacular—than the developments of the automobile, the airplane, the movies, wireless telegraphy, and radiotelephony.

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